Pacific Science (1986), vol. 40, nos. 1–4

Diopatra dexiognatha, a New Species of Onuphidae (Polychaeta) from Oahu, Hawaiian Islands[1]

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ABSTRACT: A second species of *Diopatra* Audouin and Milne Edwards from the Hawaiian Islands is described. *Diopatra dexiognatha* n. sp. differs from *D. leuckarti*, the only previously reported species from Hawaii, most notably by the possession of double rather than single postsetal lobes on the anterior parapodia. The new species is known only from the south shore of Oahu, where it occurs in dense aggregations along the shoreward margin of the fringing reef.

ONLY ONE SPECIES of *Diopatra*, *D. leuckarti* Kinberg, 1865, has been reported from Hawaii (Hartman 1966). The species was characterized by its very large and bushy branchiae and described on the basis of several specimens collected among dead corals by the *Eugenie* Expedition to Oahus. Although Kinberg stated that the species was quite common, it has not been reported since its original description.

We are reporting the discovery of another species of *Diopatra* from Hawaii, occurring in dense aggregations intertidally near Niu Valley, Oahu (as *D. leuckarti* in Bailey-Brock 1984). These specimens differ from *D. leuckarti* in a number of morphological features and are described here as a new species.

MATERIALS AND METHODS

The holotype and ten paratypes have been deposited in the Bernice P. Bishop Museum, Honolulu (BPBM). Additional paratypes have been placed in the Australian Museum, Sydney (AM) (ten); the British Museum (Natural History), London (BMNH) (ten); and the U.S. National Museum of Natural History, Smithsonian Institution, Washington (USNM) (ten).

Measurements and counts in the description are of the holotype; the range for the paratypes is given in parentheses. Body width (without parapodia) is at setiger 10; terminology follows Paxton (1986).

Examination by scanning electron microscopy (SEM) was done with specimens fixed in seawater formalin. Specimens were dehydrated in a graded ethanol series, dried in a Sorvall critical point dryer using liquid CO_2, and gold-coated in a Polaron sputter coating system. They were photographed in a JSM-T20 using a Robinson backscattered electron detector.

Diopatra dexiognatha, n. sp.

Figure 1–16

Diopatra leuckarti. Bailey-Brock, 1984:191.

Diopatra n. sp. Paxton, 1986:9, 14; figs. 5a–c, 9b.

HOLOTYPE: BPBM R2147, 12 Nov 1980.

PARATYPES: AM W.198985, Oct 1979 (ten); BMNH ZB 1985. 199–206, 26 Feb 1983 (eight); BMNH ZB 1985.207–208, May 1985 (two); BPBM R2148, 26 Feb 1983 (ten); USNM 98764, 26 Feb 1983 (eight); USNM 98765, May 1985 (two).

DESCRIPTION: Length 47 (24–40) mm, number of setigers 185 (100–130), width 1.8 (1.3–1.6) mm. Color markings as follows: aggregated brown specks on prostomium, palps, and anterior parapodia; dorsum with brown bands on peristomium and anterior margin of 10–15 anterior setigers; ventral side with two

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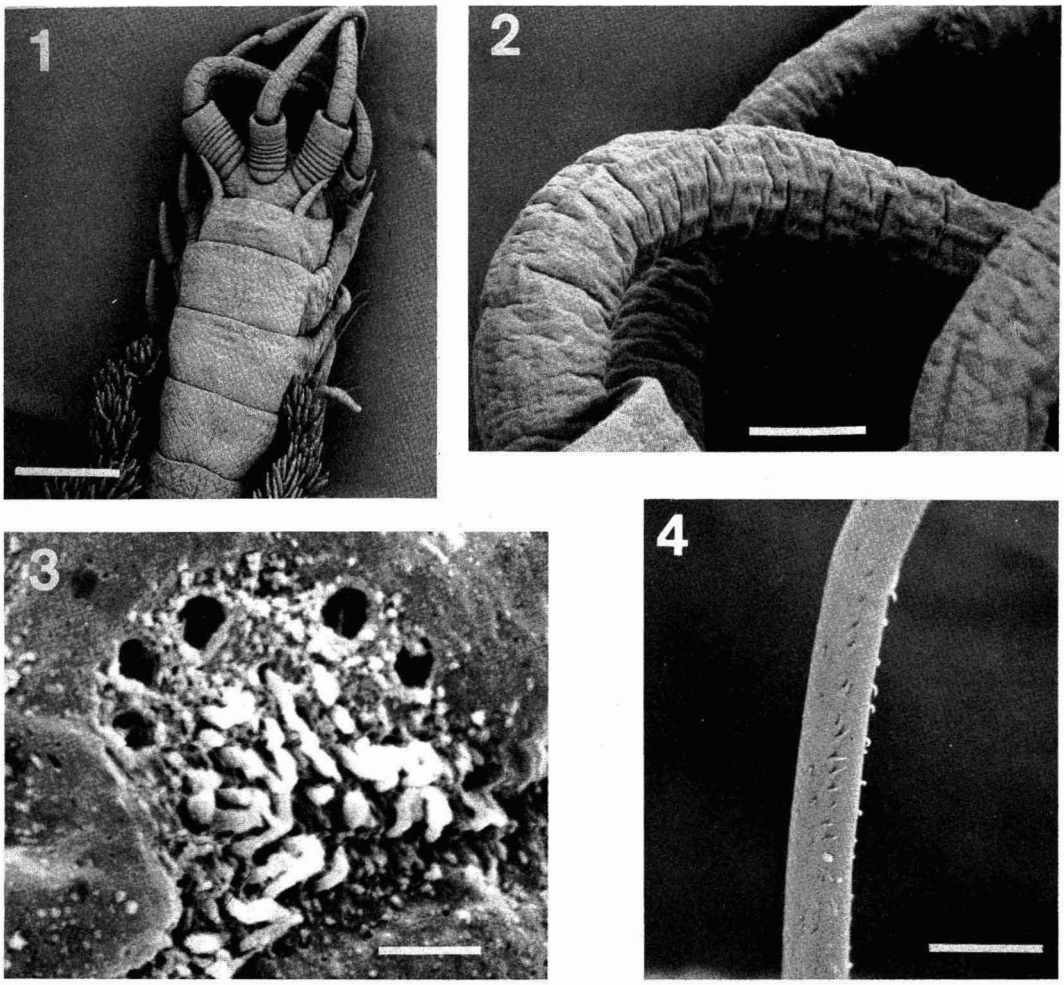
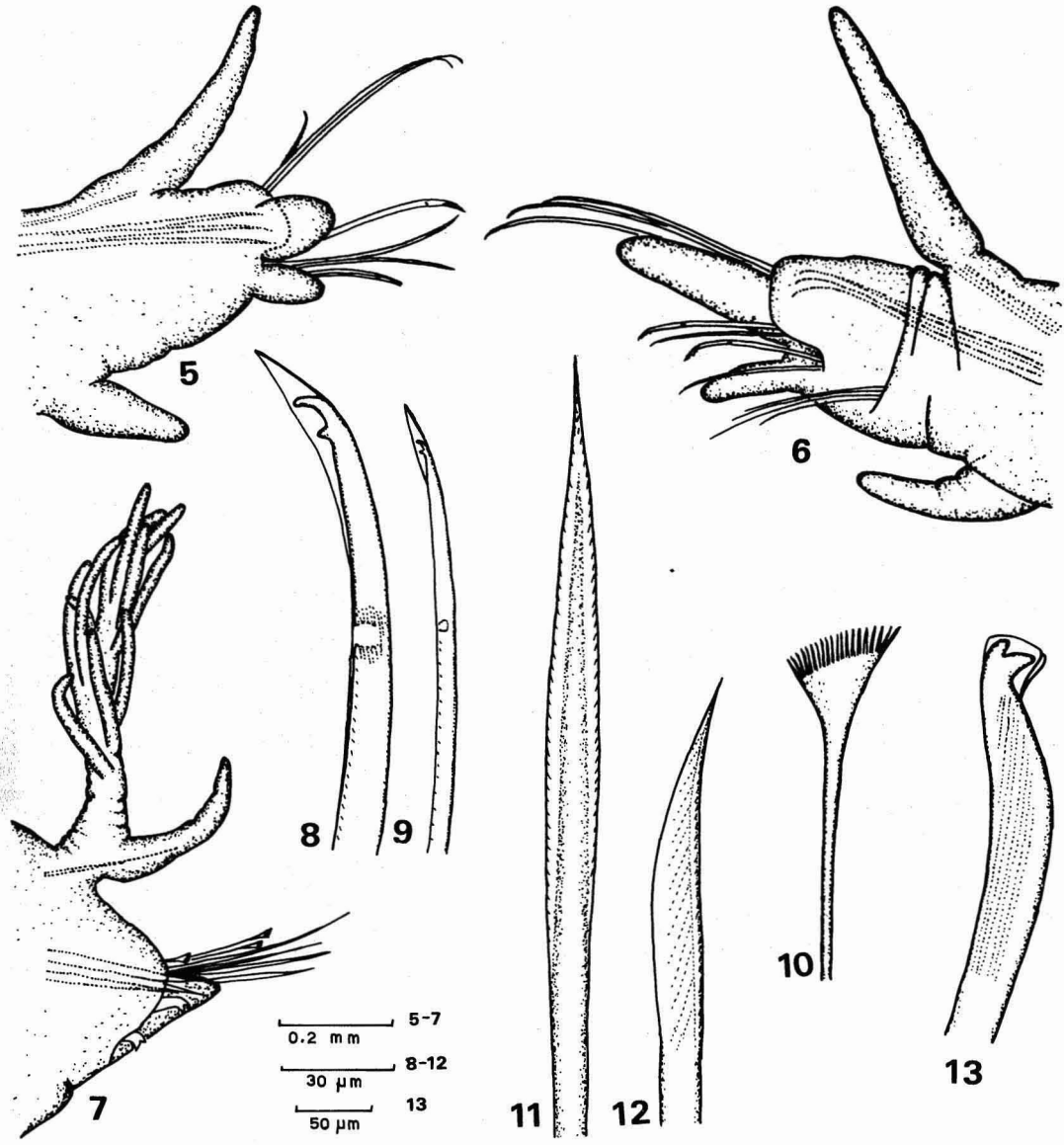


FIGURES 1–4. Scanning electron micrographs of *Diopatra dexiognatha*. *1*, anterior end, dorsal view (scale 500 μm); *2*, antennae, showing rows of sensory buds (scale 100 μm); *3*, enlarged sensory bud of same (scale 1 μm); *4*, hook with two rows of spines from setiger 3 (scale 10 μm).

lateral brown spots on each of anterior 5–8 setigers.

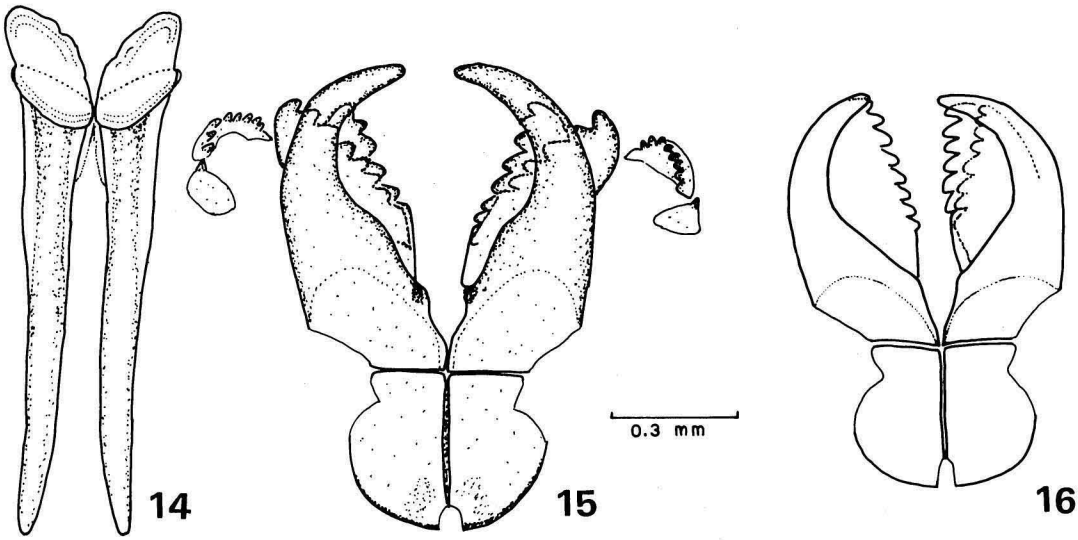
Prostomium (Figure 1) anteriorly rounded, with pair of frontal palps and pair of ventral labial palps. Ceratophores of antennae with 6–8 proximal rings and long distal ring. Styles more slender than ceratophores, posterior styles usually equally long, to setiger 10 (4–8) (most often to setiger 6 or 7), anterior laterals to 3 (2–3). Styles with 12–14 lengthwise rows of weakly defined sensory buds (Figures 2 and 3). Eyes absent. Nuchal grooves semicircular; tentacular cirri about as long as peristomium and setiger 1 together or slightly less, ventral lip with weakly defined median section.

Each of anterior 6 (5–6) parapodia with single truncate presetal and double postsetal lobes. Postsetal lobes of setiger 1 (Figure 5) ovoid, upper lobe slightly thicker and longer than lower lobe. Both postsetal lobes longer on setiger 2, best developed on setigers 3 and 4 (Figure 6) where both are digitiform, the upper about twice as long as the lower postsetal lobe. Setiger 6 with rounded presetal lobe and digitiform upper postsetal lobe; lower postsetal lobe either greatly reduced or ab-



FIGURES 5–13. *Diopatra dexiognatha* (paratype AM W.198985). *5*, parapodium 1, posterior view; *6*, parapodium 3, anterior view; *7*, parapodium 23, same view; *8*, large median pseudocompound hook from setiger 3; *9*, small pseudocompound hook from same; *10*, pectinate seta from setiger 50; *11*, upper limbate seta from setiger 10; *12*, lower cultriform limbate seta from setiger 10; *13*, subacicular hook from setiger 23.

sent. Rounded presetal lobe present to setiger 12 or 13, single remaining postsetal lobe becoming reduced by setiger 15–20 (Figure 7) and present as small boss until midbody region. Dorsal cirri digitiform, ventral cirri digitiform on anterior 6 (5–6) setigers, replaced by ventral glandular pads thereafter. Spiraled branchiae (Figures 1 and 7) from setiger 4, best developed on setiger 5–7 with 5–7 whorls, where tips of both sides meet middorsally; single filaments from setiger 100 (38–49), absent shortly thereafter.



FIGURES 14–16. *Diopatra dexiognatha*. *14*, mandibles; *15*, symmetrical maxillae; *16*, asymmetrical maxillae (Mx IV and V omitted). [14, 15 (holotype BPBM R2147); 16 (paratype AM W.198985).]

Anterior 6 (5–6) pairs of parapodia with 1–2 large median (Figure 8) and 5–7 much smaller (Figure 9) hooks. All hooks bidentate, pseudocompound with pointed hoods, and shafts with two rows of minute spines (Figures 4, 8, and 9). Pectinate setae (Figure 10) with 15–20 teeth in slightly oblique combs from about setiger 8; upper slender limbate setae from setiger 1, becoming shorter, wider, and laterally serrated (Figure 11) by setiger 10; lower cultriform limbate setae (Figure 12) from setiger 7 (6–7) replaced by two bidentate hooded subacicular hooks (Figure 13) from setiger 15 (12–15).

Pygidium with dorsal anus and paired dorsal and ventral anal cirri, latter about half as long as former. Mandibles (Figure 14) with slender shafts and high cutting plates. Maxillae weakly sclerotized, displaying symmetry variation of Mx III: both left and right Mx III present (Figure 15) in 27, only right Mx III (Figure 16) in 14, only left Mx III in none of 41 type specimens. Maxillary formula (based on holotype and four paratypes): Mx I = 1 + 1; Mx II = 5 (5–8) + 7 (6–7); Mx III = 7 (0 or 5–6) + 5 (5–6); Mx IV = 8 (6–8) + 8 (6–8); Mx V = 1 + 1.

Tube typical of genus with inner parchment-like layer and outer layer of foreign particles attached at various angles. Largest particles toward tube opening and on exposed portions; smallest particles on buried portions and scattered among larger fragments.

REMARKS: The new species differs from *Diopatra leuckarti* in an earlier origin and lesser development of the branchiae, double versus single postsetal lobes of anterior parapodia, subacicular hooks from setiger 12–15 versus setiger 22, and presence versus absence of the right maxilla III. Maxilla III is generally asymmetrical in onuphids, that is, present only on the left side. Symmetry variation (presence of both left and right Mx III or right Mx III only) has been reported for *Diopatra cuprea* in about 10% of the specimens examined (Kielan-Jaworowska 1966). *Diopatra dexiognatha* is the only reported species displaying symmetry variation in all specimens examined.

Double postsetal lobes on the anterior parapodia occur also in *D. bilobata* Imajima, 1967. *Diopatra dexiognatha* is distinguished from *D. bilobata* by the symmetry variation of Mx III, a much smaller size (maximum width 1.8 mm versus 10.0 mm), different pigmenta-

tion pattern (dorsal brown bands versus diffuse brown without pattern), and consistent origin of branchiae (setiger 4 versus 5). Double postsetal lobes are also present in specimens reported as *D. chiliensis* [*non* Quatrefages, 1865 (Ehlers 1901; Monro 1933; Fauchald 1977)], *D. amboinensis* [*non* Audouin and Milne Edwards, 1833 (Willey 1905; Pflugfelder 1929)]; however, the maxillae of these specimens display the general onuphid pattern. The taxonomy and relationships of this group of species will be clarified in a separate paper (Paxton, in prep.).

ETYMOLOGY: The specific name is derived from the Greek *dexios* (on the right) and *gnathos* (jaw) and refers to the presence of the right maxilla III.

BIOLOGY: Several specimens contained eggs, the largest of which had diameters of 180 μm. The specimens thus are adults of a small species, rather than juveniles of a larger species. Several juveniles were present in the samples but not designated paratypes. The juveniles differ from the adults in having fewer segments with pseudocompound hooks, double postsetal lobes, and ventral cirri. Branchiae start consistently on setiger 4 as in adults but are not as well developed and terminate more anteriorly. A large number of specimens examined showed that damaged worms readily regenerate anterior and posterior regions.

ECOLOGY AND DISTRIBUTION: *Diopatra dexiognatha* has a restricted distribution on the south shore of Oahu, between Aina Haina and Kawainui Beach Park near Niu Valley. Adjacent to the beach on the most shoreward aspect of the fringing reef, the worms form dense aggregations (up to 21,800 m^2) resembling low mounds. These low mounds are exposed at negative tides. The ecology and sediment-stabilizing properties of this tube-building species have been described by Bailey-Brock (1984). The habitat is characterized by reduced salinities due to groundwater seepage following rainy periods and sediment influx from channelized streams. The worms trap a greater percentage of fine particles than are present in sediment samples from the beach and nearby reef flat.

These polychaetes construct vertically oriented tubes that resemble inverted J's as the tube opening faces the substratum. Tube mouths are elaborately ornamented with fragments of shells, coral, living algae, and decaying vegetation. Worms extend one-third or more of their length from the tubes to feed in an arc around the tubes. When feeding at low tide worms are exposed to predation and desiccation.

ACKNOWLEDGMENTS

We thank Suzanne F. Doyle and Jenny Norman of Macquarie University for assistance with SEM and photography. Kristian Fauchald (USNM) kindly reviewed the manuscript.

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